

Bay Area Air Quality Management District Radio Communications System

Functional Requirements

Functional, performance and reliability requirements necessary to implement the radio communications system are provided in this spreadsheet. These requirements are based on the needs and requirements of BAAQMD as well as industry standard guidelines for radio system design, implementation and operation. Proposers should use the following codes to indicate the ability of the proposed system to meet each of the requirements contained in this Section:

Response	Code
Proposed system complies with requirement.	C
Proposed system does not comply with requirement.	X
An alternative is recommended.	A

Place responses within the appropriate column next to each requirement. Where applicable and where requested, provide additional information that describes the way in which the proposed system fulfills the given requirement or how an alternative to the requirement will meet BAAQMD's needs. Short responses may be provided in the "Comments" column, while longer answers may be provided in inserted rows or on a separate page.

All Proposers are required to respond to System, Infrastructure, Console and Miscellaneous requirements. In addition, respondents proposing a voice system must respond to the User Equipment requirements; Responders proposing a data system must respond to the Mobile Data Requirements.

Proposers are required to respond to each requirement: omitted responses will be evaluated as response codes of X (proposed system does not comply with requirement).

		Response			
#	System Requirements	C	X	A	Comments
	General Requirements				
1	The proposal shall be a turn-key solution and shall contain all of the necessary equipment and services including but not limited to the system design, site development, and installation for a fully functional system.				
2	All radio equipment must meet or exceed all applicable standards adopted by the communications industry, including, but not limited to Parts 90 and 101 of the FCC Rules and Regulations, military specifications 810C and D, appropriate Electronic Industries Alliance (EIA) and National Institute of Standards and Technology (NBS) standards, as well as any specifications set forth in this document.				
3	All proposed radio equipment shall be FCC type-accepted for operation in the manner proposed.				
4	The system shall support digital communications from radio to radio throughout the entire network. If multiplexing is used or available, discuss the access methodology of the system, e.g., CDMA, FDMA, TDMA, etc.				
5	All radio equipment shall be new, unused and in current production.				
6	All fixed equipment shall be rated for continuous operation.				
	Reliability				
7	The system shall have a high level of fault tolerance. Indicate any single points of failure within the system and discuss each of the potential system failure modes as well as failure mitigation strategies.				
	Radio Sites				
8	BAAQMD's existing system uses leased sites and towers. The proposed system may utilize the existing BAAQMD site locations. Site locations and development of new sites can also be included in the proposal.				
9	If alternate sites are proposed, all costs for site development shall be included in the cost proposal.				
10	If leased sites are proposed, estimated site leasing costs shall be included in the cost proposal.				
11	If leased sites are proposed, the Proposer shall provide all coordination services between BAAQMD and the site owner. BAAQMD shall be responsible for site lease costs, but Proposer will maintain responsibility for the proper and timely installation and activation of facilities in the required quantity and the required locations.				
12	Development of proposed sites, which includes preparing all FAA, FCC, and construction permits and licenses in compliance with all local codes and ordinances, shall be the sole responsibility of the selected Proposer.				

#	System Requirements	Response			Comments
		C	X	A	
13	A comprehensive site survey report in matrix form shall be prepared for all sites being considered for use for this project. Site requirements shall include but not be limited to electrical, shelter, floor space, UPS, generator, tower, access and property acquisitions.				
Capacity					
14	The system shall support a minimum of 200 users. If unit IDs are required, state the total number of unit IDs that are available and how the IDs will be used, e.g., for radios, consoles, etc.				
System Control					
15	The system may, as an option, provide a unique ID to each radio on the system. This ID must be modifiable to a desired alphanumeric code such as a badge number or unit ID. This ID shall be transmitted to the system controller each time the unit's Push to Talk (PTT) switch is activated.				
16	As an optional, programmable feature users should receive a distinct audible alert when their unit leaves the system coverage area. This will enable the user to determine that the unit is out of contact with the system. A visual indication is also desirable. The user, if permitted by the system manager, should be capable of disabling the audible alert. Describe your system's approach to meeting this requirement.				
17	Optionally, the system should be capable of disabling any field unit from operating on the system. If the system is shut down or disabled, any disabled units must remain disabled until re-enabled by the system manager. The system should also be capable of searching for and re-enabling the unit that has been disabled.				
Encryption (Optional)					
18	State the types of encryption that are available, and identify the Proposer's preferred approach.				
19	Provide an explanation of how encryption is implemented in the system and how encrypted voice messages will be transported through the Network. Block diagrams indicating the encrypted signal flow and the locations of decryption modules shall be clearly indicated. All points in the Network where the encrypted message is accessible as either a clear digital or clear analog signal shall be identified.				
Coverage					

#	System Requirements	Response			Comments
		C	X	A	
20	Because this system will support public safety users, coverage is of the utmost importance. The requirements herein are desired by BAAQMD to provide reliable communications by field personnel. These requirements should be considered as guidelines for the design of the system; however, based on the proposer's best judgment and public safety experience, an alternative approach can be proposed that meets BAAQMD's desire for safe reliable communications on a cost effective basis.				
21	All coverage requirements and acceptance testing shall be based on TIA TSB88.				
22	The system shall provide a delivered audio quality (DAQ) of 3.4 or equivalent.				
23	Acceptance testing will require a voice audio test. Bit error testing may also be conducted, but voice testing must be conducted to ensure that acceptable coverage is provided. State the BER for your proposed system that will deliver DAQ 3.4.				
24	For each of the counties listed below, an approximation of the current level of coverage is provided. Coverage stated is based on mobile "talk-in", which is the current limitation in system communication. For each County, state whether your proposed system will guarantee the same level of coverage indicated. In addition, the District is interested in cost-effective solutions that increase coverage throughout the region. Coverage is most important in the populated areas, and specific areas where coverage already exists (refer to the coverage map in Appendix 4 of the Supplemental Information)				
25	Alameda - 90%				
26	Contra Costa - 95%				
27	Marin - 70%				
28	Napa - 60%				
29	Santa Clara - 35%				
30	San Francisco - 90%				
31	San Mateo - 55%				
32	Solano - 95%				
33	Sonoma - 40%				
34	Separate detailed propagation studies for the following criteria should be provided:				
35	Mobile talk-in				
36	Mobile talk-out				
37	Each coverage map shall include all assumptions that were used in predicting the coverage, e.g., transmitter power, antenna model, coax length & type, etc. At a minimum, the following information must be provided with each coverage map as well as a description of how the coverage was calculated and the propagation model used:				

#	System Requirements	Response			Comments
		C	X	A	
38	Minimum signal level for acceptable communications				
39	RF power output				
40	Antenna gain and directivity				
41	Transmitter Effective Radiated Power (ERP)				
42	Effective receiver sensitivity				
43	Antenna height above ground				
44	Antenna height above average terrain (HAAT)				
45	Mobile and portable antenna type				
46	Mobile and portable RF output power				
47	Coverage testing shall occur during a mutually agreeable period of time when foliage on trees is at its peak.				

		Response			
#	System Requirements	C	X	A	Comments
	Frequencies and Licensing				
48	BAAQMD desires to reuse the frequencies shown in the supplemental materials for development of the new system. Implementation of the proposed system must address the redeployment of the frequencies that are currently in use on the existing system.				
49	The proposed system must meet all relevant FAA, FCC and other rules and regulations for deployment and operation of a land mobile radio system.				
50	While BAAQMD ultimately retains the responsibility for procuring frequencies, the successful Proposer must provide comprehensive licensing support for the new system, including completing all FCC applications and providing any necessary documentation, including 40 dBu contours, ERP worksheets, 40/22 dBu base station interference contours, mobile radio interference predictions, and base station and mobile radio interference predictions with respect to TV Channel sharing requirements of 47CFR90 Subpart L, etc.				
51	The proposed system shall not adversely impact any other communications systems collocated at the communications sites used by BAAQMD. Any interference created by the installed system will be mitigated by the successful Proposer.				
52	The proposed system shall not be adversely impacted by any other communications systems collocated at the communications sites used by BAAQMD. Any interference experienced by the installed system will be mitigated by the successful Proposer.				
	Primary and Backup Power				
53	Proposers shall be responsible for doing a power audit at each of the proposed communications sites. This audit will include AC power to site, generator power at site and DC power availability at site.				
54	Any additions or modifications to the site necessary for the proposed new equipment will be the responsibility of the Proposer. State the power requirements and power consumption at each of the sites.				
55	All fixed equipment should operate from a 115 volt/60 hertz AC source. Performance should not be compromised if the voltage varies +/- 15%. All hardware should be isolated from line voltages with grounded surge protectors and over current fuses or circuit breakers.				
56	Generators at existing facilities may be used in the Proposer's design. If existing generators are reused, Proposer shall provide all connections and interfaces required to integrate the generators in the proposed design; and maintenance costs shall be included in the cost proposal.				

#	System Requirements	Response			Comments
		C	X	A	
57	Backup power will be required for each of the transmitter/receiver sites. State your guaranteed back-up provided.				
58	Backup power will be required for the dispatch site located at the central office. State your guaranteed back-up provided.				
59	Describe in detail the power protection scheme and backup strategy that will be provided at each site, including the lifecycle of batteries.				
60	Vendors are welcome to provide an alternative approach for backup power, as long as the reliability of the communications system is maintained.				

#	Infrastructure Requirements	Response			Comments
		C	X	A	
	Equipment				
61	All equipment shall operate within the manufacturer's continuous commercial-duty rating for the local region. Proposer shall provide equipment operational specification ratings for temperature and humidity, altitude, etc.				
62	All infrastructure equipment shall be capable of operations on all of the frequencies assigned to the Public Safety Service in the 470 to 512 MHz band.				
63	All infrastructure equipment shall allow narrowband operation in any re-channelization plan of the FCC. Describe the system narrowbanding capabilities.				
64	Though BAAQMD is not specifying the technical parameters for fixed station equipment, Proposers shall offer extensive detail and documentation on equipment specifications such as (but not limited to):				
65	Transmitter specifications				
66	Receiver specifications				
67	Duplexers, transmitter combiners, receiver multi-couplers, and tower-top preamplifiers, etc.				
68	Station ID devices				
69	Power supplies				
70	Radios shall be resistant to the effects of mechanical shock caused by normal maintenance actions.				
71	The proposed design shall provide all required cooling mechanisms to maintain the necessary environmental conditions.				
72	The proposed system incorporates shielding and filtering to prevent interference from or to other radio equipment. Equipment shall meet or exceed standards set in FCC, Part 15, Subpart J, Class A EMI radiation emissions.				
73	All terminal and repeater equipment shall be capable of accommodating DS1, DS2 and DS3 voice and data interfaces.				
74	Each proposed terminal or repeater has the ability to support a multiplex drop and insert of voice, data, or other independently operating multiplex channels, as necessary.				
75	Combiners and multicouplers shall be used on all transmitters to preclude the use of multiple antennas to the greatest extent possible. State field expansion capability and limits of this equipment.				
76	Radios shall be designed to operate without degradation when connected to the proposed antenna systems.				
77	Radios shall meet the requirements of TR-EOP-000063 and other applicable standards for seismic and office vibrations when mounted in an optional seismic relay rack. Describe your approach to rack mounting equipment in the proposed design.				

#	Infrastructure Requirements	Response			Comments
		C	X	A	
78	The selected Proposer shall remove existing radio equipment (transmitters, consoles, mobiles, etc.) as it relates to the implementation of the new system. The selected Proposer must dispose of any equipment not traded in or not retained by BAAQMD. BAAQMD shall notify the Proposer of the equipment not to be retained and will coordinate the time of its removal with the Proposer.				
Site Interconnection					
79	BAAQMD will consider a variety of interconnection methods, including leased line, microwave and any others deemed appropriate by the Proposers. The following requirements apply only to those Proposers offering a microwave backbone as part of their solution.				
80	Microwave links shall be configured with hot standby or diverse/redundant paths.				
81	The system should support performance monitoring while in service.				
82	A service channel/order wire circuit shall be available at each microwave site.				
83	The system should support dropping and inserting channels throughout the network for telephone and data communications.				
84	Path predictions shall be generated as part of the system design. All data gathered during the surveys should be submitted as part of the response, including:				
85	Fade margins				
86	Dish sizes				
87	System gains and losses				
88	Link budgets				
89	System availability				
90	An alarm system should be provided. At a minimum, the following alarms should be reported:				
91	Transmitter failure				
92	Receiver failure				
93	Power failure				
94	Hot-standby switch over or alternate route				
95	The microwave system shall be supported by a minimum of ten hours standby battery power at each site.				
96	The microwave system shall have 50% expansion capacity.				
97	The successful Proposer will be responsible for coordinating all microwave licensing activities for BAAQMD. BAAQMD personnel will sign and approve all license applications.				
System Management and Monitoring					
98	If a system controller is provided, it shall be fully redundant. Explain system failure modes and operation.				

#	Infrastructure Requirements	Response			Comments
		C	X	A	
99	Fully describe the capabilities of any management system applications.				
100	There shall be a comprehensive system for monitoring the status of the network, including devices with IP addresses and those with relays or contact closures.				
101	Proposers shall thoroughly assess the presence and functionality of existing site environmental/security alarm systems. Where such environmental, security or system functional alarming is 1) not present, 2) inadequate or 3) connection to an alarm network for reporting said alarms to the place where alarms are monitored is absent or inadequate, Proposer shall identify the necessary equipment to facilitate implementation of appropriate state of the art capabilities.				
102	State the monitoring capabilities proposed for the following system components:				
103	Site power				
104	Building intrusion				
105	Tower lighting				
106	Interconnect equipment				
107	Low UPS battery				
108	Low/high 48 VDC				
109	Generator alarms				
110	Console and central electronics				
111	System controllers				
112	Antennas				
113	Base stations				
114	Fully describe the capabilities of the monitoring system.				

		Response			
#	Console Requirements	C	X	A	Comments
	General Requirements				
115	A total of 3 PC based radio consoles shall be provided at the location indicated in the supplemental material. State the expansion capabilities of the console system.				
116	Electronic equipment contained in the consoles shall be modular and reflect current concepts in control center design; the consoles shall utilize microprocessor technology for channel control.				
117	All dispatch operator positions shall be linked by a LAN network to allow for single point download of configuration information.				
118	The electronic equipment shall meet or exceed the latest applicable EIA and FCC standards and requirements, including those requirements applicable to Class A Computing Equipment in Part 15 of the FCC Regulations. In addition, the equipment shall also meet all telephone company specifications regarding audio levels on telephone lines.				
119	All electronic equipment shall be solid state design. No incandescent light bulbs or vacuum tubes (except for CRTs and LCDs) will be permitted. Sealed relays may be used where indicated.				
120	Radio consoles shall be designed to provide a very high level of reliability for public safety operations. Describe the redundancy of the console system.				
	Installation				
121	All cabling shall attach to consoles and to racks in the electronic equipment room through appropriate cable connectors to facilitate ease of removal for maintenance.				
122	All cables, terminal and punch blocks shall be properly labeled and referenced in the system documentation.				
123	All cables, other than those carrying digital signaling, between the electronic equipment racks and consoles, radio system and all other equipment, shall be routed through punch blocks mounted on a sheet of fire resistant plywood.				
124	The successful Proposer shall furnish all cables required between the consoles and the electronic equipment room punch blocks and between the punch blocks and the electronic equipment racks. Punch blocks shall be provided by the successful Proposer where needed.				
125	Plenum rated cable shall be provided and installed where required.				
126	Consoles shall be individually connected to the console central electronics with "home run" circuits. Consoles shall not be connected in a serial configuration such that failure of one console will affect other consoles.				
127	The selected Proposer shall be responsible for installing all console workstation equipment in or on BAAQMD provided console furniture.				

#	Console Requirements	Response			Comments
		C	X	A	
	Console Central Electronics (as Required)				
128	Central electronics bank shall be capable of supporting all console positions with the communications center. The central electronics should be physically separate from all workstations.				
129	Central electronics bank shall be fully redundant with no single point of system failure.				
130	Central electronics bank shall be equipped with diagnostic self tests that support automatic switchover to redundant circuits and/or cards. Notification shall be provided for any system failure or switchover to alert the dispatch supervisor as well as print a notification.				
131	Central electronics bank shall be modular in design to facilitate repair and permit expansion.				
132	Printed circuit boards shall be hot swappable or replaceable while the system is in operation.				
133	The central electronics bank shall have the capability to interface to a remotely located console. State any limitations to the distance or number of consoles by which this can occur.				
	Configuration				
134	The consoles shall be configured with the following:				
135	Minimum 20" Flat panel LCD monitor				
136	Audio control unit				
137	VU indicator that provides constant visual indication of the selected transmit audio speech levels				
138	Keyboard				
139	Optical Mouse				
140	At least two audio speakers (one for selected audio & one for unselected audio) with individual volume control. Include information on the specifications of the speakers and audio amplifier.				
141	The console electronic equipment for each radio console shall be configured to provide the selected radio audio (combined receive and transmit) to the instant call check system.				
142	Radio consoles shall have a digital clock readout in hours, minutes and seconds on a 24 hour system clock.				
143	Console clocks shall be synchronized to an appropriate source.				
144	The consoles shall support the transition from the existing system to the new system. This will require the capability to maintain communications between users on both the old and the new systems simultaneously during the migration.				

#	Console Requirements	Response			Comments
		C	X	A	
	Radio and Device Control				
145	Control of all console functions shall be accessible via a mouse or keyboard.				
146	The status of all radio channels currently configured at a given workstation shall be shown on a single, free standing display device.				
147	The following detailed information shall be displayed for a minimum of eight channels as applicable:				
148	Channel identifier/designation				
149	Channel selected				
150	Channel busy				
151	Channel patched				
152	Channel muted				
153	Channel repeat enabled/disabled				
154	If available, radio ID of current and previous transmitting radios. State the number of previous radio IDs that are shown.				
155	Describe any other display capabilities of consoles.				
	Console Furniture (Optional)				
156	As an option, please specify console furniture for 3 radio and telephone positions and 1 telephone only position.				
157	Each console position shall have space for the specified monitor, instant call check recorder and any other radio equipment, as well as a telephone.				
158	Each position shall:				
159	Be ergonomically engineered for operator comfort over extended periods of up to 10 hours				
160	Meet or exceed all ANSI and ADA specifications, specifically ANSI/HFS Standard No. 100-1988				
161	Meet the following minimal dimensions:				
162	Depth at Knee Level – 15"				
163	Depth at Toe Level – 23.5"				
164	Width – 20"				
165	Height to Bottom of Worksurface – 26.2"				
166	Have screens adjustable to be slightly below eye level for comfortable viewing.				
167	Have viewing distances between 20-24" from the operator				
168	Have acoustical fabric panels to minimize noise				
169	Be mechanically independent and equipped for single dispatcher operation				
170	Be modular in design to allow for future expansion				
171	Be easily separated to allow easy reconfiguration				
172	Have materials and style of an office-type environment with options on laminate, metal cabinet materials, and fabrics				

		Response			
#	Console Requirements	C	X	A	Comments
173	Not have sharp edges exposed				

#	Console Requirements	Response			Comments
		C	X	A	
174	Have a recess in the counter for a standard keyboard with:				
175	Ability to adjust the recess for user preferences				
176	Fixed mounting of the keyboard on the recess to prevent movement				
177	Wrist pad				
178	Have adequate workstation writing surface				
179	Be provided with an internal AC utility strip with at least 12 convenience outlets (three-prong, common ground)				
Headset Interface					
180	The Proposer shall include a headset interface kit which incorporates the circuitry required to interface headset operations with the radio system and telephone audio circuits.				
181	The Proposer shall work together with the telephone equipment contractor to resolve any problems so that a completely acceptable, functioning system is provided.				
182	Two parallel headset jacks shall be provided on all consoles.				
183	There shall be no noticeable difference in audio level in a headset when a second headset is plugged in or unplugged.				
184	Jack housings shall not contain any sharp edges; housings shall be easily accessible, but not mounted where they will snag clothing or injure a user.				
185	There shall be a headset volume control adjacent to each jack and a separate volume control for each jack on the master control panel.				
186	Selected radio audio shall be delivered to the headset ear piece on the consoles except when a telephone line is selected.				
187	The headset microphone shall be connected to the radio system when any transmit key is actuated.				
188	At all other times, the headset microphone shall be connected to the telephone.				
189	All switching of the headset audio shall be automatic. The use of manual switching shall not be acceptable.				
190	The radio audio and telephone audio shall be set at approximately the same level.				
191	DTMF tone signaling shall sound like a telephone handset when heard through the headset ear piece.				
Functions & Features					
192	Radio consoles shall have the ability to interrupt a user on a call. By transmitting on the desired channel, users monitoring the channel shall hear the transmission of the dispatcher, rather than the transmitting user. Describe how this is implemented.				

#	Console Requirements	Response			Comments
		C	X	A	
193	Each radio console shall have access to an instant call check recorder with a minimum playback time of two minutes, which shall be provided by the Proposer.				
193	Each channel shall contain an individual volume control.				
194	Each channel shall have the capability of being assigned to any external speaker.				
195	Each channel shall provide a visual indication of the incoming signals. Call indicator sensitivity shall be field adjustable by a radio technician.				
196	The system shall have an acoustical cross mute function to prevent sound from a loudspeaker on one console from being picked up by the microphone of another console where a dispatcher is transmitting on the same channel. This capability must protect all radio channels.				
197	All controls shall cross indicate the current state of operation where controls for the same channel appear in more than one console, operate the same remote radio equipment, or have the same control functions.				
Switches & Timers					
198	A master transmit switch shall control the operation of the transmit switching circuitry in the console on the selected channel. Ideally, the transmit function may be activated by a mechanical switch or by a mouse pointing device.				
199	An instant transmit function shall be available for all channels. The instant transmit function shall enable dispatchers to:				
200	Transmit on an unselected channel				
201	Allow transmission on only one channel in a patch				
202	Release of the instant transmit switch will reactivate the previously selected channel.				
203	A monitor switch shall control the operation of the tone coded squelch function in the console on the selected channels. Ideally, the monitor function may be activated by a mechanical switch or by a mouse pointing device.				
204	An all mute capability shall be provided to mute incoming unselected receiver audio for a preset time. There shall be a means for the operator to reset the timer and restore received audio to full volume. Describe the options (mute level, duration, etc.) for this function.				
205	A heavy duty, single switch foot transmit switch shall be provided. This switch shall work in parallel with the mechanical and pointing device activated transmit switches.				
Emergency Indicator (as Available)					
206	Emergency transmissions from mobile units shall result in the unit identification of the mobile being displayed on the dispatcher CRT and an audible signal at the console.				
207	Emergency signals shall remain activated until cleared by the dispatcher.				

#	Console Requirements	Response			Comments
		C	X	A	
208	There shall be the capability for this unit identification to be a plain text alias for a unit ID number. Describe how radio aliases are maintained and displayed.				
209	Describe the functioning of the emergency indicator, along with any limitations, e.g., unavailable on conventional channels, etc.				
Station Control Signaling					
210	Any tone remote control system encoder shall be capable of operating over 2-wire or 4-wire lines or any path used for speech, such as a radio frequency link. Describe the signaling capabilities provided by the consoles.				

#	Radio User Equipment Requirements	Response			Comments
		C	X	A	
	General Requirements				
211	All user equipment shall be capable of operations on all of the frequencies assigned to the Public Safety Service in the 470 to 512 MHz band.				
212	All user equipment shall allow narrowband operation in any re-channelization plan of the FCC. Describe the system narrowbanding capabilities.				
213	All user equipment shall be capable of operation without significant degradation when subjected to shock, humidity and vibration.				
214	All user equipment shall be capable of direct unit-to-unit communications, independent of system infrastructure.				
215	Radios shall perform a self test when turned on to verify proper operation.				
	Radio Specifications				
216	Product information sheets shall be provided for each radio that is available on the proposed system. At a minimum, the following information shall be included:				
217	Construction details (enclosure type, chassis type, etc.)				
218	Size				
219	Weight				
220	Transmitter specifications				
221	Receiver specifications				
222	Power supplies				
223	Display character length				
224	Microphones and speakers				
225	Power consumption				
226	Operating temperature range				
	Emergency Activation				
227	User radios shall be equipped with an emergency button. Describe functionality of the emergency button, and any limitations on its use.				
228	Emergency buttons shall be appropriately protected from inadvertent activation.				
	RF Control Stations				
229	RF Control Stations shall be supplied with all necessary equipment for installation and operation, including:				
230	Mounting hardware				
231	Microphone				
232	Speaker				
233	Power supply				
234	Antenna and coaxial cable. Indicate the model antenna that will be installed.				
235	Transmission lines shall be one continuous piece of coaxial cable.				
236	Antennas must be installed to provide adequate talk-in and talk-out under all conditions.				

#	Radio User Equipment Requirements	Response			Comments
		C	X	A	
	Mobile Radios				
237	All mobile radios shall have mounting hardware suitable for installation in the respective vehicle. BAAQMD will approve the mounting location for radios. Unit costs for mobile radio installation should be included on the cost sheet.				
238	Installation will not adversely affect vehicle electronics and will meet vehicle wiring specifications.				
239	Vendors will be responsible for complete installation of the mobile radios and associated equipment. The labor and equipment necessary to make existing installations compatible with new radios should be included.				
240	Mobile unit displays must be easy to read in direct sunlight or when mounted inside a vehicle.				
241	The mobile radios must have the ability to setup preprogrammed channels to make it easier to switch channels.				
242	All mobile units must have the ability to easily set or preprogram which channels to scan.				
	Mounting				
243	Mobile Radios shall be supplied with all necessary equipment for installation and operation in a vehicle, including:				
244	Mounting hardware				
245	Microphone				
246	Speaker				
247	Cabling (cables shall be insulated & waterproof and lengths shall be appropriate for the vehicle in which the radio will be installed)				
248	Fuses and reverse polarity protection				
249	Antenna and coaxial cable. Indicate the model antenna that will be installed.				
250	A prototype installation for each vehicle must be approved by BAAQMD's Project Manager prior to fleet installation.				

#	Radio User Equipment Requirements	Response			Comments
		C	X	A	
	Power				
251	Mobile radios shall operate from a nominal 13.8 Volt DC primary power source, and shall be equipped with suitable reverse polarity protection to avoid damage if the radio or battery were to be incorrectly installed.				
252	Primary power input shall be adequately fused.				
253	Describe any special power requirements for your proposed user equipment.				
254	The radios may not be damaged in any way, nor shall they lose programming when off, transmitting, receiving, or in standby mode when the vehicle starter motor is engaged.				
255	Control heads shall not require batteries to be replaced.				
	Optional Equipment				
256	In addition to the proposed user equipment, unit pricing shall be provided in a table for each radio model that is available on the proposed system. Included in the table shall be (as applicable):				
257	Model				
258	List price				
259	Discounted price				
260	Software feature sets				
261	Full duplex radios				
262	Available options, including:				
263	Remote control heads				
264	Status messaging				
265	Initial programming				
266	Reprogramming				
267	Installation (mobiles)				
268	Additional quantity discounts				
269	Cost information shall be provided with the cost proposal.				

#	Mobile Data Requirements	Response			Comments
		C	X	A	
	System Functionality				
270	The system design shall provide a unique ID to each mobile data device (MDD) on the system. Respondents shall describe the number of unit IDs provided on the proposed system.				
271	Respondents shall propose a design that can accommodate at least 70 mobile data users as well as future users. Describe how many users the system can accommodate.				
272	Describe the type of mobile data device specified for the proposed solution. Do you plan to use inspectors' existing laptop computers?				
273	Dispatchers (RTOs) shall be able to send accurate information to field personnel with the following functions supplied by the system:				
274	MDD operator shall receive an audio and/or visual alert of incoming messages				
275	Dispatcher shall be able to address predefined groups of units				
276	The audible alert should be different for an emergency message and a regular message				
277	The system shall be designed to provide MDD direct access to District intranet databases including IRIS.				
278	The network controller should track data on system performance, loading and alarms for management analysis and system optimization. The network should generate statistical reports on:				
279	System loading profile				
280	Round trip message times				
281	Number of failed transmissions				
282	Transaction logs for all users				
283	Host interface traffic				
284	Backbone interface traffic				
285	Base station activity				
286	Remote terminal information				
287	Controller internal information				
288	Controller peripheral information				
289	The proposed design shall allow MDD users to create and send free form messages:				
290	To all units				
291	To a specific unit ID				
292	To a predefined group of users				
293	To dispatchers				
294	The system shall support the following message processing functions and have the ability to notify MDD users of the following status:				
295	Number of messages received				

#	Mobile Data Requirements	Response			Comments
		C	X	A	
296	Number of messages waiting				
297	Message acknowledged of not received				
298	Number and priority of queued messages				
299	The proposed data system shall provide vehicle location information for each MDD. Describe the GPS approach.				
300	State the minimum equivalent of data rate, in bps, which the proposed solution will communicate over the radio link. Identify raw data rate and expected throughput of the proposed system. Please state the expected availability of higher data rates, if any.				
301	The proposed network controller should support a complete interface from existing host computers through the network backbone to MDDs.				
302	The controller should be able to route messages from:				
303	MDD to individual MDD				
304	MDD to IRIS or other specified intranet database				
305	MDD to a group of MDDs				
306	MDD to electronic mail systems				
307	The network controller should track MDD location/status to minimize system traffic and choose the best method for message routing.				
308	System faults and alarms should be monitored in the system controller and backbone. Describe the proposed fault and alarm condition that are monitored.				
Applications					
310	Whether run on a computer or other mobile data device (MDD), proposed data applications should allow text and status messaging as appropriate and coupled with GPS coordinates to accomplish, at a minimum, the communications covered in Appendix 6 of the Supplemental Material Attachment.				
311	To minimize transmitted data, all messages should be capable of using predefined data entry forms (masks).				
312	MDD shall be capable of storing a minimum of 10 predefined entry forms.				
313	New formats should be downloadable for special information gathering and in-field form updates.				
314	The forms should be accessible by means of dedicated function keys, menus, or both.				
315	The MDD display shall have the following features:				
316	Brightness and contrast controls				
317	Characters should be able to be displayed in blinking, highlight and underline formats.				
318	The message buffer should be able to store messages for later viewing and include the following functions:				

#	Mobile Data Requirements	Response			Comments
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319	The MDD should store a minimum of 50 full screen pages of text that have been delivered for later recall.				
320	Host computer should store messages when MDD buffer is full.				
321	The MDD shall support simple, one-button updates for unit status, providing the following minimum functions:				
322	Status reporting by special predefined keys.				
323	Status information shall include GPS coordinates.				
324	Forms should be available at the touch of a single key.				
325	MDD messages should remain displayed or available for recall until inspector has deliberately cleared the message.				
326	Ability to scroll and page forward and backward through messages that exceed the MDD screen capacity.				
327	Field supervisors and dispatchers should be able to view a summary screen showing status information for all or a subset of users.				
Equipment					
328	To operate in a vehicular environment, the MDD must have the following capabilities:				
329	The unit must operate with the standard 12 volt DC negative ground electrical system.				
330	Ability to tolerate noise and spikes on the power system.				
331	Ability to provide short-term battery back-up or equivalent to preserve critical information during brief power interruptions.				
332	The MDD should be as self-contained as possible but still flexible enough to provide attachment of peripherals:				
333	The connections to the MDD should be quickly and safely detachable to ease unit stallation and removal.				
334	The required external connections should be kept to a minimum.				
335	The MDD should also be equipped with standard parallel and serial ports for attachment of peripheral devices.				
336	The MDD should be designed so that it does not emit signals that interfere with AM/FM radio reception or portable/mobile voice radios in the vehicle. The unit should be shielded to potect it from signals emitted by the vehicle and other in-vehicle equipment.				
337	To operate reliably, the MDD shall be designed to withstand:				
338	High vibration and shock				
339	Exposure to liquids and dust				
340	Temperature ranges from -15 F to +140 F (-30C to +60C)				
341	The MDD shall not adversely impact other vehicle electronics.				

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342	The MDD must have the following features:				
343	Adjustable screen angle and keyboard position.				
344	The keyboard should be designed for operation with one hand, with special function keys that are discernable to touch.				
345	The keyboard shall have a standard typewriter layout (QWERTY) and spacing for character keys should be utilized.				
346	Display brightness should be adjustable for ease of viewing in ambient light.				
347	Display should be easily visible in bright sunlight and at night.				
348	MDD must be capable of being mounted in vehicles with driver and passenger side airbags.				
349	The MDD equipment should have solid state construction.				
350	Internal electronics shall be modular and designed for easy upgrades and repairs.				
Security					
351	The system shall provide security of message transmission to all intended message destinations.				
352	Each user shall have a unique log-on and password that can be used on any MDD.				
353	A user shall be able to temporarily secure access to the MDD with a single key and unlock the unit by entering a password.				
Miscellaneous					
354	Respondents shall propose alternatives to providing coverage requirements to low density areas, including but not limited to state parks and uninhabited areas. Alternatives should be developed with the intention of reducing the overall cost of the data system.				
355	If multiple frequencies are used, the backbone should automatically equalize channel loading between frequencies, and MDDs should automatically switch to another data frequency as necessary when roaming between coverage areas.				

		Response			
#	Miscellaneous Requirements	C	X	A	Comments
	Documentation				
356	Footprint drawings of all proposed equipment shall be provided with your proposal.				
357	Proposer shall include existing equipment that will either remain at a given site in all as built drawings.				
358	Where possible, Proposers are encouraged to leave the bottom 12 inches of rack space unused. As an alternative, low maintenance equipment shall be installed in the lowest spaces of the racks. Proposals shall include drawings showing the arrangement of all equipment in each rack.				
359	The successful Proposer will be required to provide a minimum of three copies of the following documents for all system infrastructure:				
360	As-built documentation				
361	Operating manuals				
362	Installation manuals				
363	Service and maintenance manuals				
364	Manuals shall indicate all safety precautions to be taken by personnel employed in the installation, operation or maintenance of the equipment.				
365	Provide a list of the recommended manuals, recommended quantities and their unit costs in the cost proposal.				
366	BAAQMD would also like to obtain manuals in electronic format. Describe what manuals will be provided in electronic format.				
367	Provide one copy of Proposer's installation standards and practices (provide CD-ROM copy, if available) with the proposal.				
	Implementation				
368	Communications shall be supported during the transition between the existing system and the new system. Describe how this will be accomplished and how inadvertent disabling of interconnections by a dispatcher will be prevented.				
	Installation				
369	The dispatch center and radio sites may need structural, electrical, and mechanical modifications prior to equipment installation. The selected Proposer shall be responsible for doing a facility audit at each of the proposed communications sites.				
370	The Proposer shall not take any action that will prevent the continuous operation of all existing communications systems during the changeover to the new land mobile radio system. Short outages may be approved at the discretion of BAAQMD's Project Manager.				

#	Miscellaneous Requirements	Response			Comments
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371	Industry standard installation techniques will be used throughout the system, particularly with respect to lightning protection and grounding. Provide one copy of Proposer specific installation standards and practices (not to be included in individual proposals).				
372	All installation technicians shall have appropriate training and experience. All technicians assigned to perform installation in fixed locations and vehicles shall be approved by the manufacturer of the equipment.				
373	Equipment shall be installed in open equipment racks. State the dimensions of the equipment racks.				
374	As an option, equipment shall be installed in enclosed cabinets. Provide pricing for replacing open racks with cabinets in the cost proposal.				
375	All fixed location radio equipment racks and cabinets shall ideally have at least three feet of access space to perform repairs. Instances where this cannot be accomplished in existing facilities should be noted and discussed in the proposal.				
376	The system shall include cable ladders mounted above the racks for cable distribution. All power, signal, and transmission line cables shall be routed on the cable ladder in a workmanlike manner.				
377	Racks shall be properly secured to the floor of the facility as well as to the adjacent racks.				
378	Equipment shall be properly attached to the rack in which it is mounted.				
379	The Proposer shall provide and install all wiring between radio equipment racks and punch blocks as well as all wiring between those punch blocks and punch blocks installed by other contractors when intersystem interfacing is required.				
380	Proposer shall provide necessary terminating equipment on the Proposer's side of existing punch blocks to connect to the appropriate facility on BAAQMD's side of punch block.				
381	Where punch blocks are required but do not exist, Proposer shall provide appropriate punch blocks and terminating equipment.				
382	The Proposer shall coordinate with each site owner's representative to assure compliance with any special provisions applicable to the site.				
383	Coaxial cable shall be anchored according to designs approved by BAAQMD's Project Manager or otherwise shall be anchored to support structures at no more than the maximum distance recommended by the manufacturer.				
384	Each run of cable shall be one continuous piece from antenna to radio, multicoupler, combiner, duplexer, or lightning arrestor, without a splice or connectors, except that a jumper may be used at the equipment end.				

#	Miscellaneous Requirements	Response			Comments
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385	At sites with multiple antennas, each cable shall be identified with laminated or steel tags that include the operating frequency of the connected station and elevation of the antenna on the support structure. Tags shall appear at on the base of the antenna supporting structure, in the vicinity of the radio equipment, and at the base of the antenna as a minimum.				
386	All packing material, excess wire and material required for installation shall be removed prior to beginning the acceptance testing. The floor areas are to be vacuumed or swept and shall represent a clean and orderly work area.				
387	The outdoor areas of each site shall be clear of all scrap material, packing and packaging material, etc.				
Design Review					
388	Subsequent to contract award, the successful Proposer shall conduct a design review with the BAAQMD project team to examine and finalize the system design. The following documents shall be provided to BAAQMD:				
389	System block diagrams with all major components and functions indicated.				
390	Tower design and antenna configuration.				
391	Power and HVAC requirements at each site. The power requirements and power dissipation shall include all the equipment installed at each site.				
392	Grounding details.				
393	Module layout for major items of land mobile equipment and console electronics.				
394	Equipment racks/cabinet layouts for all equipment and console electronics.				
395	Cable routing diagrams.				
396	Transmission line cable entry details at each site.				
397	Floor plans showing equipment locations for all land mobile and microwave radio equipment and console electronics. Special attention shall given to the placement of and relationship between legacy equipment and new system equipment.				
398	Antenna support structure elevations showing antennas and feed line configurations for all land mobile radio equipment.				
399	Implementation schedule.				
400	Detailed training plan.				
System Testing					
401	After the equipment has been manufactured, the system shall be staged at the Proposer's facility. During this staging, the equipment shall be mounted in the racks/cabinets that will be used at the sites and cables shall be cut to length and installed.				

#	Miscellaneous Requirements	Response			Comments
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402	Preliminary testing shall be conducted on the equipment at the staging facility. BAAQMD personnel will have the opportunity to attend and participate in this factory testing.				
403	Vendors are responsible for demonstrating to BAAQMD that the proposed system meets the requirements for coverage, reliability and functionality as outlined below:				
404	Coverage - Vendors shall submit a system coverage test procedure that must be approved by BAAQMD. The tests must give full assurance that the system meets all coverage requirements specified in this document.				
405	Reliability - Vendors shall submit a system reliability demonstration test procedure that must be approved by BAAQMD. The procedure must give full assurance that the system will support public safety agencies on a 24-hour x 7-day-a-week basis.				
406	Functionality - Vendors shall submit a functionality test procedure that must be approved by BAAQMD. The procedure shall identify the tests to be conducted and shall provide for adequate testing of all functions of the entire system.				